Past Papers Int 1 Chemistry

2002 Marking Scheme

Grade Awarded	Mark Required (/60)	
A	42+	70%
B	36+	60%
C	30+	50%
D	?	?
No award	?	?

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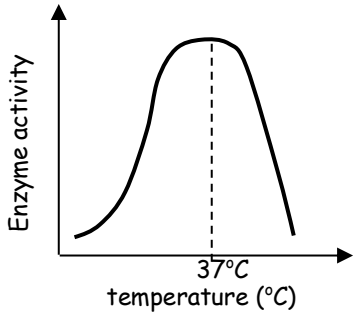
MC Qu	Answer	% Pupils Correct	Reasoning
1	B	63	☒A Argon is in group 0 and not in the same group as Chlorine (group 7) ☒B Iodine and chlorine are both in group 7 so have similar chemical properties ☑C Oxygen is in group 6 and not in the same group as Chlorine (group 7) ☒D Sulphur is in group 6 and not in the same group as Chlorine (group 7)
2	A	90	☑A Chlorine is added to water to kill bacteria ☒B Carbon Dioxide is added to water to make fizzy drinks ☒C Lead in water can cause Lead Poisoning ☒D Fluoride is added to drinking water to help prevent tooth decay
3	D	34	Air contains: Approx 20% oxygen | Approx 80% nitrogen | Less than 1% other gases
4	D	86	☒A Largest particle size and lowest temperature ∴slowest reaction ☒B Largest particle size and highest temperature ∴medium speed of reaction ☒C Smallest particle size and lowest temperature ∴medium speed of reaction ☑D Smallest particle size and highest temperature ∴fastest reaction
5	C	40	☒A substance is an element made of molecules (not ions) ☒B substance is a compound made of molecules (not ions) ☑C substance is made of charged particles called ions ☒D substance is a compound made of molecules (not ions)
6	B	48	Type | pH at start | pH during neutralisation Acid | Below 7 | Goes up Alkali | Above 7 | Goes down
7	B	29	Acid + Metal Carbonate → Salt + Water + Carbon Dioxide hydrochloric acid + magnesium carbonate → magnesium chloride + water + carbon dioxide
8	A	66	☑A iron reacts with oxygen but not with water (p5 data booklet) ☒B magnesium reacts with both oxygen and water (p5 data booklet) ☒C silver reacts with neither oxygen or water (p5 data booklet) ☒D sodium reacts with both oxygen and water (p5 data booklet)
9	A	29	☑A Anodising protects aluminium by increasing the thickness of the outer oxide layer ☒B electroplating coats a metal in a less reactive metal to stop air/water getting to steel ☒C Galvanising coats steel/iron in zinc to sacrificially protect the steel/iron ☒D Tin-plating coats steel/iron in tin to provide a barrier to air/water getting to steel
10	B	84	Fire Blankets put out fires by stopping oxygen getting to the fire to keep the flames going. Fires are put out by removing one of: Oxygen | Heat | Fuel
11	C	54	☒A water alone cannot be used to remove oil/grease (detergent is required) ☒B soapless detergent is used in hard water areas instead of regular detergents ☑C special solvents are used in dry cleaning to remove stains from garments ☒D washing powder is used to remove grease/dirt from clothes
12	B	46	☒A cracking breaks long chain hydrocarbons into more useful shorter hydrocarbons ☑B crude oil is separated into different compounds by their different boiling points ☒C fermentation takes place in yeast and turns glucose into alcohol ☒D polymerisation is the process where monomers join together to make polymers

13	C	40	☒A Alcohol is a biofuel made by fermentation of sugar ☒B hydrogen is an cleaner alternative to fossil fuels with no greenhouse gases ☑C biogas is mainly methane and is released by decomposition of living materials ☒D oil is a fossil fuel
14	D	89	☒A Bakelite is a thermosetting plastic used in plugs and sockets ☒B Kevlar is a modern plastic used in bullet proof vest due to its strength ☒C Silicone is a plastic used to give a waterproof seal in building structures ☑D Starch is not a plastic
15	A	34	☑A Combustion is the burning of a substance and its reaction with oxygen ☒B Corrosion is the reaction of metals to become compounds ☒C Fermentation takes place in yeast and turns glucose into alcohol ☒D Neutralisation is the reaction of acids to become water.
16	B	60	☒A Pesticides are used to control plant pests ☑B Herbicides are used to kill weeds ☒C Fungicides are used to prevent plant disease ☒D Fertilisers are used to replace essential elements in the soil
17	C	67	Enzymes work best at body temperature (37°C) and the speed of reaction decreases as the temperature gets further away from 37°C 
18	A	77	☑A a drug is a substance which alters the way your body works ☒B some drugs damage your health but most drugs are helpful to your body ☒C some drugs damage your health but most drugs are helpful to your body ☒D Many drugs are legally available e.g. aspirin and paracetamol
19	C	29	1 pint of beer = 2 units of alcohol It takes 1 hour for the body to break down 1 unit of alcohol ∴2 units of alcohol will take 2 hours to be broken down in the body
20	D	40	☒A Methanol is very toxic – it can cause blindness and death ☒B Methanol is a type of alcohol – not one you can drink though! ☒C Methanol is very toxic – it can cause blindness and death ☑D Methanol cannot be used in alcoholic drinks as it will cause blindness and deaths

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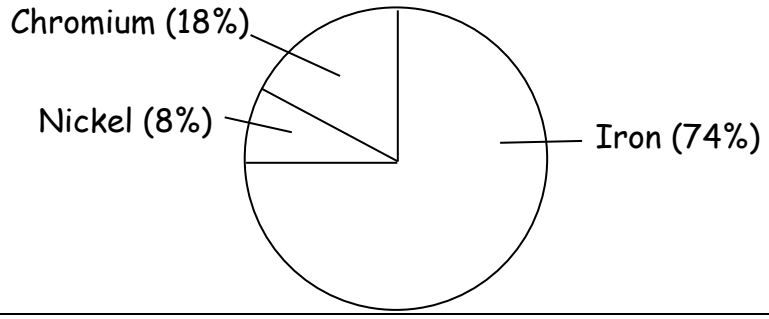
<table>
<tr><th>Long Qu</th><th>Answer</th><th>Reasoning</th></tr>
<tr><td>1a</td><td>2 or more atoms joined together by bonds</td><td>Molecules are made up of two or more atoms held together by strong bonds.</td></tr>
<tr><td>1b</td><td>NO</td><td>
<table>
<tr><td>Prefix</td><td>Mono-</td><td>Di-</td><td>Tri-</td><td>Tetra-</td></tr>
<tr><td>Meaning</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>Example</td><td>carbon monoxide
CO</td><td>nitrogen dioxide
NO_2</td><td>sulphur trioxide
SO_3</td><td>carbon tetrachloride
CCl_4</td></tr>
</table>
</td></tr>
<tr><td>1c</td><td>nitrogen monoxide + oxygen
↓
nitrogen dioxide</td><td>nitrogen monoxide + oxygen ⟶ nitrogen dioxide</td></tr>
<tr><td>2a</td><td>C_3H_6 or H_6C_3</td><td>The molecule contains 3 C (carbons) and 6 H (hydrogens)</td></tr>
<tr><td>2b</td><td>Carbon Dioxide And Water</td><td>Propene is a hydrocarbon and burns in a plentiful supply of air to form carbon dioxide and water</td></tr>
<tr><td>2c</td><td>Monomers</td><td>
<table>
<tr><th>Name</th><th>Definition</th></tr>
<tr><td>Monomer</td><td>Small molecules which join together to make a polymer</td></tr>
<tr><td>Polymer</td><td>The large molecules made when monomers join together</td></tr>
<tr><td>Polymerisation</td><td>Process where the large polymer is made from monomers</td></tr>
</table>
</td></tr>
<tr><td>3a</td><td>Light Bulb</td><td>The circuit requires a light bulb to be added to show electricity is flowing in the circuit and the material being tested is a conductor</td></tr>
<tr><td>3b</td><td>
<table>
<tr><td>non-metal</td><td>conductor</td></tr>
<tr><td>metal</td><td>conductor</td></tr>
</table>
</td><td>Gallium is a metal and all metals are conductors of electricity
Carbon (graphite) is the only non-metal which conducts electricity</td></tr>
<tr><td>4a</td><td>sodium oxide or calcium oxide</td><td>
<table>
<tr><td>Type of Solution</td><td>Acid</td><td>Neutral</td><td>Alkaline</td></tr>
<tr><td>Colour with damp pH Paper</td><td>Red</td><td>Green</td><td>Blue/purple</td></tr>
</table>
</td></tr>
<tr><td>4b</td><td>Turns blue</td><td>Lithium is a metal so forms a metal oxide
• metal oxides turn damp pH paper blue</td></tr>
<tr><td>5a</td><td>Answer to include:</td><td>• Add compound to test tube with water
• Stopper test tube and shake
• Observe if substance is still at bottom (insoluble)
• If substance has ‘disappeared’ – substance is soluble</td></tr>
<tr><td>5b</td><td>Harmful or irritant</td><td>
<table>
<tr><td>Hazard</td><td>Harmful/Irritant</td><td>Poisonous</td><td>Corrosive</td><td>Flammable</td></tr>
<tr><td>Symbol</td><td>  </td><td>  </td><td>  </td><td>  </td></tr>
</table>
</td></tr>
<tr><td>5c</td><td>Damage to marine life e.g. kills fish</td><td>Fertilisers are soluble and heavy rain can wash fertilisers into rivers, lakes and lochs. Too much fertilisers can lead to the green algae population increasing rapidly which can remove all the oxygen from the water making the water lifeless</td></tr>
<tr><td>6a</td><td>Alloys</td><td>An alloy is a mixture of metals or a mixture of metals with non-metals</td></tr>
</table>

6b — Pie Chart showing:



6c — % corrosion increases

As the solution becomes more acidic, the pH of the solution DECREASES

- The lower the pH, the higher the percentage corrosion

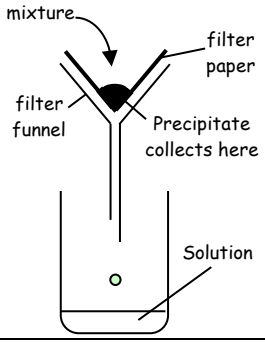
7a — sodium + carbon + oxygen

-ide	Compound contains the two named elements	NB metal always comes first in name
-ate	Compound contains 3 elements (two named elements + oxygen)	
-ite	Compound contains 3 elements (two named elements + oxygen)	

7b(i) — Solid has been formed

4 signs of a chemical reaction:
Gas given off Solid being formed Energy Change Colour Change

7b(ii)



Insoluble solids are too big to fit through the holes in the filter paper and collect in the filter paper

8a — Chlorophyll

Chlorophyll is the pigment found in chloroplasts in plant cells. Chlorophyll is green and absorbs the light energy needed for photosynthesis to occur.

8b(i) — Closer to lamp gives more bubbles of gas

As the distance from the lamp decreases, the number of oxygen bubbles in one minute increases.

8b(ii) — Temperature

Plants grow quicker in warmer temperatures

9a — Let test tube settle for 15 seconds

The mixture has to settle before measurement of the volume of lather.

9b — Repeat twice to get duplicate results

Experiments should be carried out more than once to show the results are accurate.

10a — Increases length of time food last before going off

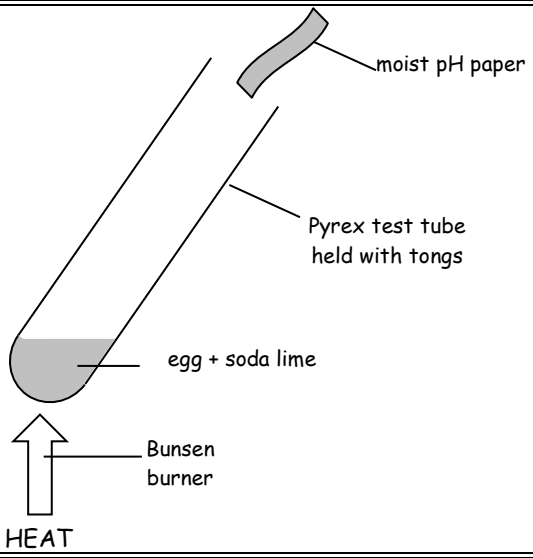
Additive	Reason for adding
Colouring	To alter the appearance of the food
Preservative	To improve the keeping qualities of the food so it stays fresh for longer
Flavouring	To alter the flavour of the food e.g. sweetner
Vitamins/Minerals	To supply and enhance the nutritional value of the food

10b — One from:

colouring	To alter the appearance of the food
sweetner	To alter the flavour of the food

11 — ½ mark each for:

Green vegetables

<table>
<tr><td></td><td></td><td>Fight disease
Vitamin C
Vitamin D</td></tr>
<tr><td>12a</td><td>Nitrogen</td><td>
<table>
<tr><th>Food Type</th><th>Carbon</th><th>Hydrogen</th><th>Oxygen</th><th>Nitrogen</th></tr>
<tr><td>Carbohydrates</td><td>✓</td><td>✓</td><td>✓</td><td>✖</td></tr>
<tr><td>Fats</td><td>✓</td><td>✓</td><td>✓</td><td>✖</td></tr>
<tr><td>Proteins</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
</table>
</td></tr>
<tr><td>12b</td><td>Strong alkali
or soda lime</td><td> 
</td></tr>
<tr><td>12c</td><td>Proteins are needed for growth and tissue repair</td><td>
<table>
<tr><th>Food Type</th><th>Importance to Diet</th></tr>
<tr><td>Carbohydrates</td><td rowspan="2">Provides body with energy</td></tr>
<tr><td>Fats</td></tr>
<tr><td>Proteins</td><td>Needed for body growth and tissue repair</td></tr>
<tr><td>Fibre</td><td>Keeps gut working properly preventing constipation</td></tr>
</table>
</td></tr>
<tr><td>13a</td><td>Renewable fuels will not run out in future</td><td>Non-renewable fuels will eventually run out with use e.g. fossil fuels
Renewable fuels can be made as quickly as they are being used up e.g. biogas (methane) and ethanol from sugar</td></tr>
<tr><td>13b(i)</td><td>Biodegradable</td><td>Biodegradable substances can be broken down by bacteria.
Non-degradable substances cannot be broken down by bacteria.</td></tr>
<tr><td>13b(ii)</td><td>Less steep line</td><td>If diesel from crude oil breaks down slower than biodiesel then the steepness of the line will be less.</td></tr>
<tr><td>14a</td><td>Man-made material</td><td>Synthetic materials are not found in nature and are made by the chemical industry</td></tr>
<tr><td>14b</td><td>2</td><td>10% of 20million tonnes = $\frac{10}{100}$ x 20 million tonnes = 2 million tonnes</td></tr>
<tr><td>14c</td><td>Nitrogen</td><td>3 essential elements for plant growth:
Nitrogen Phosphorus Potassium</td></tr>
</table>